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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,656	11/26/2003	Jose M. Sosa	API-1017-US(COS-919)	8871

25264 7590 07/01/2008
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ART UNIT	PAPER NUMBER
1796	

MAIL DATE	DELIVERY MODE
07/01/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/723,656
Filing Date: November 26, 2003
Appellant(s): SOSA ET AL.

Tenley R. Krueger
For Appellant

Supplemental EXAMINER'S ANSWER

Note: This Supplemental Examiner's Answer corrects section (8) to indicate references in the Appendix (B) in the Appellant's Brief filed on December 15, 2006 and the Reply Brief filed on June 06, 2007.

Pursuant to the remand under 37 CFR 41.50(a)(1) by the Board of Patent Appeals and Interferences on March 14, 2008 **for further consideration of a**

rejection, a supplemental Examiner's Answer under 37 CFR 41.50(a)(2) is set forth below:

The supplemental examiner's answer is responding for clarification of the appeal record, entry of the submitted evidence and analysis of the evidence.

Appendix B. Evidence:

Reference (4): Article by E.R. Wagner and L.R. Robeson, "Impact Polystyrene: Factors Controlling the Rubber Efficiency," Rubber Chem. Tech., Vol. 43, pp 1129-1137, (1970) was filed on 03/04/2005 and entered with the office action mailed on 04/18/2005.

Reference (5): U.S. Patent No. 6,703,460 is cited first time with Appeal filed on 11/08/2005.

The evidence is considered in detail in the section (10) below.

The evidence does not overcome all rejections under appeal.

The supplemental examiner's answer is without raising any new grounds of rejection. The evidence does not affect the examiner's position as set forth in the Examiner's Answer mailed on April 18, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on June 16, 2005 has not been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,433,092	Krupinski et al	8-2002
6,274,641	Krupinski	8-2001
6,420,444	Krupinski	7-2002
6,608,141	Krupinski et al	8-2003
6,166,099	Krupinski	12-2000
6,703,460	Blackmon et al.	03-2004

E.R. Wagner and L.R. Robeson, "Impact Polystyrene: Factors Controlling the Rubber Efficiency," Rubber Chem. Tech., Vol. 43, pp.1129-1137, (1970).

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krupinski et al U.S. Patent 6,433,092 or Krupinski U.S. Patent 6,166,099, or Krupinski U.S. Patent 6,274,641, or Krupinski U.S. Patent 6,420,444, or Krupinski et al. U.S. Patent 6,608,141.

Independent claim 1 and dependent claims 2-12 discloses a method for producing an improved copolymerized product comprising: copolymerizing at least one vinylaromatic monomer with at least one diene polymer in the presence of at least one multifunctional initiator selected from the group consisting of trifunctional and tetrafunctional peroxides, and recovering a copolymerized product that has a ratio of % gel to % rubber (G/R) that increases as swell index increases.

Independent claim 13 and dependent claims 14-25 discloses an improved copolymerized product made by the process comprising: copolymerizing at least one vinylaromatic monomer with at least one diene polymer in the presence of at least one multifunctional initiator selected from the group consisting of trifunctional and tetrafunctional peroxides, and recovering a copolymerized product that has a ratio of % gel to % rubber (G/R) that increases as swell index increases.

Independent claim 26 and dependent claims 27-36 discloses a resin comprising: at least one vinylaromatic monomer, at least one diene polymer; at least one multifunctional initiator selected from the group consisting of trifunctional and tetrafunctional peroxides, where the amount of multifunctional initiator is sufficient to produce a copolymerized product that has a % gel to % rubber (G/R) ratio that increases as swell index increases.

The references of record belong to the same inventor to Krupinski.

Krupinski Patent 6,433,092 (hereinafter Krupinski'092) discloses a process for polymerizing a vinyl aromatic monomer with a rubber polymer in the presence of a tetrafunctional peroxide initiator, column 5, lines 12-13, 22-23 and 31-35. The

tetrafunctional initiator such as 1,2,3,4-tetrakis(t-amylperoxycarbonyloxy) butane and the tetrakis (t-C_{4-6} alkyl monoperoxycarbonates) are readable in the present claims 5, 17 and 32, see column 9, lines 2-4. The tetrafunctional peroxide initiator is present in an amount from about 100 to 1000 ppm, preferably from about 200 to 400 ppm (0.02 to 0.044 weight %), column 8, lines 50-64. An amount of the multifunctional initiator in the present claims 7, 19 and 34 is in the range from about 50 to about 1200 ppm, based on the vinylaromatic monomer. Thus, the amount of the multifunctional initiator in Krupinski'092 is within the range in the present claims 7, 19 and 34. The copolymerized product has a polydispersity index in the ranges from 2.38 to 3.97, column 12, Table 1. The polydispersity index is readable in the present claims 12, 21 and 28. The rubber is present in the amount from about 3 to 10% weight based on the total weight of the composition fed to the reactor, column 8, lines 32-35. The amount of rubber in Krupinski'092 is within the range specified in the present claims 9, 23 and 35. The resulting polymer has a melt flow index at condition G (200 C/5 kg) load of less than 5 grams/10 minutes, preferably less than 2.5 grams/10 minutes, column 10, lines 13-16 and claim 9 at column 20. The melt flow index in the range from about 2 is readable in the present claims 2, 14 and 29. The first reaction temperature in the first reaction zone is 100 to 130 C and then in the subsequent reaction zone is relatively higher temperature from about 130 to 160 C, column 9, lines 10-12. The temperature condition in the polymerizing process is readable in the present claims 8 and 22. Using a peroxy carbonate initiator the resulting polymer may have not more than 50 weight % of branched polymer, column 9, lines 19-21. The residence time and the reaction

temperature are controlled for producing high impact polystyrene (HIPS), column 9, lines 9-31 and column 8, line 35. The branched resulting polymer is readable in the present claims 6, 18 and 33.

Krupinski Patent 6,166,099 (herein after Krupinski'099) discloses a resin that is high impact polystyrene (HIPS) produced by a process comprising a polymerization of a vinylaromatic monomer in the presence of a tetrafunctional peroxide initiator and a rubbery polymer. The process conditions for producing the resulting polymer are substantially the same that are in the Krupinski'092 invention discussed above. See Krupinski'099, column 2, lines 57, 63-66; column 3, lines 58-66; column 5, lines 27-48 and 54-67; column 6, lines 62-64; column 9, Table 1 for polydispersity index and melt flow condition. The rubbery polymer is present in an amount from 3 to 10 weight %, claim 12 at column 12. A cell foam product is an article for the present claim 36.

Krupinski Patent 6,274,641 (hereinafter Krupinski'641) discloses a process for preparing a closed cell foam=article such that said article is produced by polymerizing a vinylaromatic monomer in the presence of a tetrafunctional peroxide initiator and a rubbery polymer. The resulting polymer is high impact polystyrene (HIPS). The process conditions for producing HIPS are substantially the same as in Krupinski'092 invention. See Krupinski'641 column 2, lines 59, 65-66; column 4, lines 37-38; column 5, lines 35-66 and column 6, lines 3-8 and 38-45; column 9, Table 1 for polydispersity index and

melt flow condition. The rubber polymer is present in an amount from 3 to 10 weight %, column 12, claim 21.

Krupinski Patent 6,420,444 (hereinafter Krupinski"444) discloses styrenic polymer produced by polymerizing styrene monomer with a rubbery polymer in the presence of a tetrafunctional peroxide initiator. See Krupinski'444 column 2, lines 59-66; column 3, lines 59-65; column 4, lines 63-67; column 5, lines 10-67; column 6, lines 62-67 and column 9, Table 1 for the polydispersity index and melt flow condition.

Krupinski patent 6,608,141 (hereinafter Krupinski'141) discloses a polystyrene article comprising high impact polystyrene (HIPS) produced by polymerizing a vinylaromatic monomer with a rubbery polymer in the present of a tetrafunctional peroxide initiator. See Krupinski'141 column 4, lines 57-66, column 5, lines 34-66; column 6, lines 20-25; column 7, lines 56-60; column 8, lines 40-60; column 9, lines 6-30 and column 13, Table 1 for polydispersity index and melt flow condition.

All patents to Krupinski disclose a process for producing high impact polystyrene. The difference between the present claims and each cited Patent to Krupinski is the requirement in the present claims that a resulting copolymerized product has a ratio of % gel to % rubber (G/R) that increases as swell index increases. It would have been obvious to one of ordinary skill in the art to consider that the ratio of % gel to % rubber can be obtained in each Patent to Krupinski invention because each reference discloses a process for making a HIPS wherein the process conditions are controlled by the

residence time and the reaction temperature in the presence of the same tetrafunctional peroxide initiator and the amount of said tetrafunctional initiator and the amount of rubber polymer, such that all limitations of the process conditions are readable in the present claims. The term "improved" in the present claims 1 and 13 would be readable for HIPS having high tensile strength in each Krupinski invention (see Krupinski'092, col. 16, lines 31-40). The prima facie case of obviousness is that the analogous process condition for producing a HIPS in the presence of the same tetrafunctional peroxide initiator in each Krupinski invention can produced a high gel value of a rubber, and, thereby, high swell index will occur in each Krupinski invention.

(10) Response to Argument

Appellant's argument is that none in Krupinski invention teaches or suggests a ratio of % gel to % rubber (G/R) that increases as the swell index increases, as recited in the pending claims. References do not use the phrase that a "(G/R) increases as swell index increases."

The claimed process comprises a step of copolymerizing styrene monomer with at least one diene polymer in the presence of at least one multifunctional initiator. The key of the invention is to use a multifunctional initiator selected from the group consisting of trifunctional and tetrafunctional peroxides to control the gel and swell index. The rubber having a high gel value is a benefit to control the elasticity of HIPS product. Each Krupinski invention discloses the **same tetrafunctional peroxide** initiator being present in the amount within the range specified **in the present claims 7, 19 and 34.** The

amount of rubber polymer from 3 to 10 wt.% **is within in the range specified in the present claims 9, 23 and 35.** Each Krupinski invention discloses the **analogous process conditions** for producing HIPS product. The **polydispersity index and a melt flow index** in the resulting HIPS product in each Krupinski invention **are readable in the present claims.** The **claimed multifunctional peroxide initiators** such as 1,2,3,4-tetrakis(t-amylperoxycarbonyloxy) butane and the tetrakis (t-C_{4-6} alkyl monoperoxycarbonates) **are readable in each Krupinski** reference (Krupinski' 092 at column 9, lines 2-4; Krupinski' 099 at column 5, lines 46-48; Krupinski' 641 at column 5, lines 54-56; Krupinski' 644 at column 5, lines 46-48; Krupinski' 141 at column 9, lines 6-8). There is no argument that any Krupinski reference discloses different process condition. There is no argument that any Krupinski invention discloses different tetrafunctional peroxide. It would have been obvious to one of ordinary skill in the art to use a process for polymerizing a vinylaromatic monomer with a rubbery polymer consisting of conjugated diolefins in the presence of a tetrafunctional peroxide for producing resulting copolymer (for example, Krupinski'6,433,092 at column 5, lines 13-49), wherein the claimed "increase the swell index" will occur in each Krupinski invention for being similar to the present claims in the absence of evidence to the contrary. If appellant is going to rely on unexpected results, note that appellant's assertion of "improved copolymerized product" has not been established for the entire scope of the claims. In particular, the invention concerns initiating polymerization of a vinyl aromatic monomer such as styrene in various solvents and in the optional presence of a polydiene, such as polybutadiene, with a multifunctional initiator (e.g. tri-

or tetrafunctional) and to use the multifunctional initiator to obtain branched structures [0019] at page 4 in the original specification. In light of the similarity of the properties of the HIPS in each Krupinski invention with the present claims, the resulting product will have the analogous function as a ratio of % gel to % rubber (G/R) that increases as swell index increases. In view of the foregoing, each Krupinski's teaching does render the process and the composition of the instant claims obvious.

Appellant argument is that "It would not have been obvious to those of ordinary skill in the art to choose trifunctional and tetrafunctional peroxides to produce a copolymerized product having a G/R that increases as swell index increases. Such an effect (e.g. G/R increasing as swell index increases) was not known and in fact the contrary was believed," Page 4 in the Appeal Brief of December 15, 2006 and page 2 in Reply Brief of June 05, 2007. Appellant present evidence: Reference (4) and Reference (5).

Reference (4) is an article to E.R. Wagner and L.R. Robeson, "Impact Polystyrene: Factors Controlling the Rubber Efficiency," Rubber Chem. Tech., Vol. 43, pp.1129-1137, (1970). Article discloses a composite consisting of a continuous rigid polystyrene phase and a dispersed rubber phase containing occlusions of polystyrene. The morphology of the dispersed rubber phase and the rubber phase volume depend on the size of the rubber microgels. The rubber phase volume increases rapidly with decreasing agitation (page 1129). Article discloses a process for producing a composition by batch polymerization of styrene in the presence of polybutadiene rubber

(page 1131) by mechanical process by controlling rate agitation (page 1137). There is no claimed multifunctional initiator selected from the group consisting of trifunctional and tetrafunctional peroxides in that Article. Appellant fails to show the claimed copolymerizing components limitation in the present method for producing an improved copolymerized product for the present claims 1-12 in this Article; nor the claimed copolymerizing components in the copolymerized product for the present claims 13-25; and Appellant fails to show a resin product comprising at least one vinylaromatic monomer, at least one diene polymer, and at least one multifunctional initiator in this evidence for the present claims 26-36.

Reference (5) is U.S. Patent No. 6,703,460 to Blackmon et al referring to Table III. Blackmon discloses sequential polyperoxides initiators for vinylaromatic/diene copolymers, column 1, lines 16-28. The **Table III at column 7 shows a difunctional polyperoxide initiator.** All examples of polyperoxide initiators are difunctional peroxide initiators. The resulting copolymer shows rubber particle size decreases and lower swell indices, column 7, lines 52-66, by using a difunctional peroxide. All example at Table III show bifunctional peroxides having one terminal hydroperoxy group and one internal peroxy group. The sequential polyperoxide initiator is effective to accelerate the rate of polymerization, to increase the grafting of the resultant co-polymer, claim 13 at column 9. None of the mention peroxide compound in Table III discloses claimed tri- or tetrafunctional peroxide compound in the present claims 1, 13 and 26; none example discloses internal tri- or tetrafunctional peroxide in the present claims 5, 17 and 32.

The evidence has no value to obviate any reference to Krupinski invention. Appellant' argument that reference to Patent No. 6,703,460 has the opposite conclusion is not persuasive, because the working examples at Table III disclose a difunctional peroxide, whereas each Krupinski reference discloses a tetrafunctional peroxide. The present specification at page 17, Table IV discloses the effect of the bifunctional peroxide initiator on the rubber swell index, examples 13-16; and the tetrafunctional initiator, examples 17-18 showing the increasing swell index as for obtaining the best result.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

The appellant must within **TWO MONTHS** from the date of the supplemental examiner's answer exercise one of the following two options to avoid *sua sponte* **dismissal of the appeal** as to the claims subject to the rejection for which the Board has remanded the proceeding:

(1) **Reopen prosecution.** Request that prosecution be reopened before the examiner by filing a reply under 37 CFR 1.111 with or without amendment, affidavit, or

other evidence. Any amendment, affidavit, or other evidence must be relevant to the issues set forth in the remand or raised in the supplemental examiner's answer. Any request that prosecution be reopened will be treated as a request to withdraw the appeal. See 37 CFR 41.50(a)(2)(i).

(2) **Maintain appeal.** Request that the appeal be maintained by filing a reply brief as set forth in 37 CFR 41.41. If such a reply brief is accompanied by any amendment, affidavit or other evidence, it shall be treated as a request that prosecution be reopened under 37 CFR 41.50(a)(2)(i). See 37 CFR 41.50(a)(2)(ii).

Extensions of time under 37 CFR 1.136(a) are not applicable to the **TWO MONTH** time period set forth above. See 37 CFR 1.136(b) for extensions of time to reply for patent applications and 37 CFR 1.550(c) for extensions of time to reply for ex parte reexamination proceedings.

Respectfully submitted,

/Olga Asinovsky/

Olga Asinovsky

Examiner

Art Unit 1796

June 18, 2008

Conferees:

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A Technology Center Director or designee has approved this supplemental examiner's answer by signing below:

/Gregory L Mills/

Supervisory Patent Examiner, Art Unit 1700